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EXAMINER

CARIASO, ALAN B

ART UNIT PAPER NUMBER

2875

DATE MAILED: 09/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/342,210

Applicant(s)

KOHNO, MICHIO

Examiner

Alan Cariaso

Art Unit

2875

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 01 July 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 9, 10, 27 and 28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-26 and 29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Response to Amendment***

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 2-8, 12-26 and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claims 2, 12, 22 and 29 commonly recite "said converting optical system being effective to make a luminous intensity distribution ...into a distribution of a shape without a central void". This phrase is indefinite as being misdescriptive and/or lacking structure to support this function or condition. From applicant's disclosure, the converting optical system is designated as ref.no. "12" or dotted box in figures 7, 8, 12 & 14 and "13" in figure 10 and further claimed in depending claims 6, 7, 16 and 17. The above functional phrase claimed in claims 2,12,22 and 29 and structure claimed in claims 6, 7, 16 and 17 defining the converting optical system are misdescriptive and/or lack the structure to produce a light distribution without a central void because the specification shows otherwise as illustrated on plane "20" in figures 8 and 10.

4. Claims 2, 12, 22 and 29 commonly recite a similar phrase "wherein a diameter of flux of light upon the predetermined plane is substantially equal to a diameter of flux of light upon the entrance surface of the light transmitting element / optical fiber bundle", which is indefinite, because both the "light upon the predetermined plane" and the "light

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upon the entrance surface" are unclear in origin or lack relationship with any part(s) of the claimed invention.

5. Claim 8, line 2, the phrase "said imaging optical system includes fly's eye lens and a lens unit" is indefinite as being misdescriptive. The specification identifies the fly's eye lens (31) and lens unit (collimator 32) in figure 14 as the converting optical system, not as the imaging optical system.

6. Claim 25 is indefinite for depending on canceled claim 27.

7. Claim 25, the limitation "projection optical system" lacks structural relationship with any part of the invention claimed.

### ***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

9. Claims 1, 11, 25 and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by NAGAYAMA (US 5,797,674).

10. NAGAYAMA discloses an illumination optical system (fig.1) comprising: an imaging optical system (301) and a converting optical system (302), the converting optical system (302) having a numerical aperture (as defined by diameter of light source image) not greater than a numerical aperture (col.1, lines 32-34) of a light transmitting element (303) or optical fiber bundle (200,210); further having an exposure apparatus comprising: the illumination optical system (fig.17) and a projection optical system (109) which collectively provides the method of applying a resist to a wafer, transferring, by exposure, a pattern of a mask onto the wafer by use of the exposure apparatus and developing the wafer having the pattern transferred thereto.

11. Claims 2-5, 8, 12-15, 18-23, 25, 26 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by OMATA (US 5,218,660).

12. In regards to claims 2, 4, 5, 12, 14, 15, 22 and 29, OMATA discloses an illumination optical system (figs.2 & 10) comprising: an imaging optical system (elliptical mirror 2) forming an image of light source ("1" being an Hg lamp with its center at the 1<sup>st</sup> focal point of mirror col.4, lines 3-4) at a predetermined plane ("3a" disposed at the 2<sup>nd</sup> focal plane of elliptical mirror 2, col.4, lines 6-8) and inherently forming a luminous intensity distribution of a shape with a central void; a converting optical system (fly-eye lens "3" spaced from a collimator lens "4") directing light from the light source image to a

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total reflection type light transmitting element or optical fiber bundle (light pipe assembly 5) and forming a luminous intensity distribution of a shape without or minimizing a central void (col.6, lines 56-63);

13. In regards to claims 3 and 13, given the structure of the imaging optical system and light source of OMATA, it is inherent that the light source image formed by said imaging optical system has an illuminance which is larger in a portion adjacent an optical axis of the light transmitting element than in a peripheral portion about the optical axis.

14. In regards to claims 8 and 18, the converting optical system of OMATA includes fly's eye lens (3) and a lens unit (4), wherein a light entrance surface (3a) of the fly's eye lens (3) is disposed substantially in coincidence with the light source image (inherent for the light source disposed at 1<sup>st</sup> focal point of elliptical mirror 2 to form its image at the 2<sup>nd</sup> focal plane 3a) formed by the imaging optical system (2), and wherein one focal point position of the lens unit (4) is disposed substantially in coincidence with a light exit surface (3b) of the fly's eye lens (col.4, lines 10-11), while another focal point position of the lens unit (4) is disposed substantially in coincidence with a light entrance surface (5a) of the light transmitting element or optical fiber bundle (5) (col.4, lines 11-13).

15. In regards to claims 19-21 and 23, the optical fiber bundle (5) of OMATA has a light entrance (5a) of a rectangular shape (col.4, lines 13-14) and light exit face of arcuate shape (col.4, lines 13-15 & 50-52); wherein the optical fiber bundle (5) comprises a total reflection type and distributed refractivity type optical fiber bundle

(col.4, line 64 to col.5, line 33); wherein the light transmitting element (5) comprises an optical rod (col. 4, line 64 to col.5, line 3; or light pipe ("18"-figs.10-11)).

16. In regards to claims 25 and 26 that depends on claims 2, 12 and 22; OMATA discloses an exposure apparatus comprising: an illumination optical system (1-5) and a projection optical system (80,fig.2) which collectively provides the method of applying a resist (or circuit pattern) to a wafer (W), transferring, by exposure, a pattern of a mask (8) onto the wafer (W) by use of the exposure apparatus and developing the wafer having the pattern transferred thereto (col.1, lines 11-23).

17. As for the phrase "wherein a diameter of flux of light upon the predetermined plane is substantially equal to a diameter of flux of light upon the entrance surface of the light transmitting element / optical fiber bundle" (recited in last lines of applicant's claims 2, 12, 22 & 29), a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

### ***Claim Rejections - 35 USC § 103***

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims 1, 11 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over OMATA (US 5,218,660).

20. In regards to claims 1 and 11, OMATA discloses applicant's invention substantially as claimed except a numerical aperture of the converting optical system not greater than a numerical aperture of the light transmitting element or the optical fiber bundle. It would have been obvious to one having ordinary skill in the art at the time of applicant's invention to provide the illumination device and exposure apparatus of OMATA in which the collimating lens (4) of the converting optical system directs substantially all light toward the light transmitting input end thereof such that the numerical aperture of converting optical system at the input end of light transmitting element is not greater than that of the light transmitting element or fiber bundle since it is known in the art of illuminated optical systems for exposure apparatus to direct substantially all of the flux(es) from a light source optical system toward the mask or wafer to be illuminated through an intermediate light transmitting element in order to efficiently use all the light or light fluxes.

21. Claim 24 recites the light source comprises a plurality of laser light sources. OMATA does disclose that light source can be a laser light source (col.2, lines 63-64), but not a plurality of them. It would have been obvious to one having ordinary skill in the art at the time of applicant's invention to provide a multiplicity of parts as in plural



lasers in order to produce plural fluxes toward the optics intermediate the wafer to be illuminated.

### ***Allowable Subject Matter***

22. Claims 6, 7, 16 and 17 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

### ***Response to Arguments***

23. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.


### ***Conclusion***

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. OHTA (US 4,683,524) shows two lens units, one lens (3) at the 2<sup>nd</sup> focal point of an elliptical reflector (2) with light source (1) and the other lens (6) at the entrance end of a light transmitting element (5). HOPLER et al (US 5,680,492) show optical coupler as a lens (16) between an optical fiber (12) and fiber bundle (14) where the numerical apertures of the fiber and bundle are not greater than each other. LACOMBAT et al (US 4,375,315) show a internal reflective transmitting element (6,fig1) changing a light distribution having a central void to one that has no central void (figs.2a,2b).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Cariaso whose telephone number is (703) 308-1952. The examiner can normally be reached on M-F (9:00-5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (703) 305-4939. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.



Alan Cariaso  
Primary Examiner  
Art Unit 2875

AC  
September 19, 2002